

## REMARKS

### Amendment to the specification

The specification was amended to describe briefly the prior art reference U.S. 5,408,556 to Wong, cited by the Examiner in the present action. This amendment is for clarification purpose in that it helps a reader understand more precisely the contributions made by the invention to the state of the art. No new matter was added.

### Amendment to the claims

Claim 1 was amended to recite "*said facet being formed by cutting and polishing or by ~~cleaving or cut and polishing~~*", to clarify that the facet is formed either by cutting and polishing or by cleaving. Claim 1 was also amended to recite "*said facet having a cross section other than approximately equal to the cross section of an individual single-mode fiber*", to distinguish the invention as recited in claim 1 from the intermediate cleaved fused bundle part that is used to make the 1xN splitter disclosed by Wong and briefly described in page 3 of the specification.

Claims 2-4 are unchanged.

Claim 5, previously dependent on claim 28, was rewritten in independent form by reciting the features previously recited in claim 28, in a clarified language.

Claim 6 was canceled.

Claim 7 is unchanged.

Claim 8 was made dependent on claim 28.

Claims 9-10 are unchanged.

Claim 11 was clarified consistently with claim 1. Claim 11 was also amended by reciting the features previously recited in claim 15.

Claim 12 is unchanged.

Claim 13 was made dependent on claim 12.

Claim 14, previously dependent on claim 11, was rewritten in independent form by reciting the features previously recited in claim 11, in a clarified language.

Claim 15 was cancelled.

Claim 16 is unchanged.

Claim 17 was made dependent on claim 11.

Claims 18-19 are unchanged.

Claim 20 was amended consistently with claim 1.

Claims 21-24 are unchanged.

Claim 25 was amended to recite that "*the fibers have each a core and a cladding and a mode shape*" and that "*the sum of the mode shapes of the fibers is calculated, and the core/cladding size ratio and stretch are selected, to maximize coupling of the free space beam into the core ensemble*". This amendment is supported by the application, for example figures 5A and 5B and the corresponding portion of the specification.

Claim 26 is unchanged.

Claim 27 was amended consistently with claim 1.

Claim 28 was clarified consistently with claim 1. Claim 28 was also amended by reciting the features previously recited in claim 6 and by reciting that the fibers have each a core and a cladding and a mode shape and that the sum of the mode shapes of the fibers is calculated, and the core/cladding size ratio and stretch are selected to maximize coupling of the free space beam into the core ensemble. This amendment finds support in the application, for example Figures 5A, 5B and the corresponding portion of the specification. Claim 28 was also amended by canceling the feature of the facet being "*in a direction perpendicular to said fiber axis*", consistently with the scope of canceled claim 29.

Claim 29 was cancelled to avoid redundancy with claim 28.

Claim 30, previously dependent on claim 29, was rewritten in the dependency of claim 28.

New claim 31, depending on claim 27, was added to recite features consistent with the features recited in claim 25.

No new matter was added.

#### Objection to the claims

Claims 1, 11, 20 and 27-29 stand objected to for reciting the limitation "*said facet being formed by cleaving or cut and polishing*", deemed to be unclear. The Applicants note that claim 29 was canceled and that claims 1, 11, 20 and 27-28 were amended to recite that the facet is formed "*by cutting and polishing or by cleaving*" so as to remove any ambiguity from the language of the claims, and respectfully request the Examiner to withdraw the present objection.

#### Rejection under 35 U.S.C. 102

Claims 1-4, 6, 8-13, 17, 19-23 and 25-30 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,408,556 to Wong. As detailed hereafter, the Applicants respectfully disagree.

#### Claim 1

Wong relates to a 1 x N splitter for single-mode optical fiber that is made (see claim 1 of Wong) with an individual single-mode optical fiber and a bundle of non-symmetrical arranged single-mode fibers that are fused together along a portion of their lengths. The Applicants note in particular that Wong recites in its claim 1 that "the

bundle has a total diameter approximately equal to the diameter of said individual single-mode fiber". The other independent claims 4 and 6 of Wong recite similar features. The Applicants note that a bundle having a total diameter approximately equal to the diameter of an individual single-mode fiber will necessarily have a cross section approximately equal to the cross section of an individual single-mode fiber.

On another hand, independent claim 1 as amended recites a facet *"having a cross section other than approximately equal to the cross section of an individual single-mode fiber"*. Claim 1 is therefore not anticipated by Wong.

Further, the Applicants note that since the feature of the bundle having a total diameter approximately equal to the diameter of an individual single-mode fiber is common to all three independent claims of Wong, such feature is essential to the invention of Wong and a device not having such feature is not within the scope of the disclosure of Wong. The Applicants note that such device lacking an essential feature of the invention of Wong and not being within the scope of the disclosure of Wong can in particular not be deemed to perform satisfactorily the intended purpose of the invention of Wong.

As provided in section 2143.01-I of the M.P.E.P., "obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art". In particular, as provided in section 2143.01-V of the M.P.E.P., "if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification".

It follows that it cannot be argued that there is any suggestion or motivation in the art to modify the invention of Wong to have a bundle with a diameter different from

the diameter of an individual single-mode fiber, because such modified device lacks an essential feature of Wong's invention and is not within the scope of Wong's disclosure and is thus unsatisfactory for the intended purpose of Wong's invention.

Claim 1 as amended recites a facet *"having a cross section other than approximately equal to the cross section of an individual single-mode fiber"*. Claim 1 is therefore not obvious over Wong and the cited prior art.

#### Claims 20 and 27

The Applicants respectfully submit that the arguments used above to show that claim 1, which recites a facet *"having a cross section other than approximately equal to the cross section of an individual single-mode fiber"*, is new and non-obvious over Wong can also be used to show that claims 20 and 27, which both relate to an apparatus with a facet *"having a cross section other than approximately equal to the cross section of an individual single-mode fiber"*, are new and non-obvious over Wong and the cited prior art.

#### Claim 28

The Applicants note that Wong recites in each of its independent claims (1, 4 and 6) that the bundle of fibers is juxtaposed/joined to the individual single-mode optical fiber through a focusing lens/junction element. The Applicants note that by doing so Wong unambiguously discloses that the feature of the bundle being juxtaposed, through a focusing lens/junction element, to the individual single-mode fiber is an essential feature of Wong's invention.

As detailed above in relation with claim 1, the Applicants respectfully submit that a device modified so that it does not comprise all the essential features of Wong would not be within the scope of Wong's disclosure and would be unsatisfactory for the intended purpose of the invention of Wong. It follows that it cannot be argued that

there is any suggestion in the prior art to modify Wong by canceling Wong's essential feature of the individual single-mode fiber and focusing lens/junction element being juxtaposed to the bundle.

On another hand, the skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent from illuminating the facet of the bundle with a single optical input traveling in free space.

It follows that illuminating the facet of the bundle with a single optical input traveling in free space is not obvious over Wong, at least because it would require a non-obvious modification of the invention of Wong.

It follows that it is also not obvious to modify the device of Wong to maximize coupling of a free space beam with the bundle; and in particular by calculating the sum of the mode shapes of the fibers and selecting the core/cladding size ratio and stretch to maximize coupling of the free space beam into the core ensemble.

Claim 28 as amended recites that *"the facet is adapted to receive a single optical input traveling in free space, the fibers having each a core and a cladding and a mode shape, the sum of the mode shapes of the fibers being calculated, and the core/cladding size ratio and stretch being selected, to maximize coupling of the free space beam into the core ensemble"*. It follows that claim 28 is not obvious over Wong.

#### Claim 11

Claim 11 was amended to recite the features previously recited in claim 15. The patentability of claim 11 is discussed hereafter in relation with the 35 U.S.C. rejection of claim 15.

Claims 2-4, 6, 8, 9, 10, 21-23, 25-26, and 29-30

Claims 6 and 29 were cancelled. Claims 2-4, 8, 10 and 30 depend on claim 28; claim 9 depends on claim 1; claims 21-23 and 25-26 depend on claim 20 and claim 31 depends on claim 27. The Applicants respectfully submit that at least in view of their dependency on claim 28, 1, 20 or 27, claims 2-4, 8, 9, 10, 21-23, 25-26 and 30 are patentable over Wong and the cited prior art.

Rejection under 35 U.S.C. 103

Claim 15 stands rejected under 35 U.S.C. 103 (a) over Wong; claims 7, 16 and 24 stand rejected under 35 U.S.C. 103(a) as being obvious over Wong in view of U.S. Patent No. 4,915,467 to Berkey; and claims 5 and 14 stand rejected under 35 U.S.C. 103(a) as being obvious over Wong in view of U.S. Patent No. 4,932,747 to Russel. The Applicants respectfully disagree.

Claim 15 (claim 11)

The Examiner notes that Wong does not disclose illuminating the facet with a single optical input (mistyped output) propagating in free space, and instead discloses the facet receiving a single optical input from an optical fiber. However, the Examiner opines that "being that the apparatus is capable of receiving an optical input, it would have been obvious to one of ordinary skill in the art to use any optical source in conjunction with the apparatus, including an optical signal propagating in free space". The Applicants respectfully disagree.

The features of claim 15 are now recited in independent claim 11. Claim 15 was cancelled. So, the limitation heretofore in claim 15 will now be discussed with respect to claim 11.

The Applicants note that Wong recites in each of its independent claims (1, 4 and 6) that the bundle of fibers is juxtaposed/joined to an individual single-mode optical fiber through a focusing lens/junction element. The Applicants note that by doing so Wong unambiguously discloses that the feature of the bundle being juxtaposed, through a focusing lens/junction element, to the individual single-mode fiber is an essential feature of its device. As detailed previously in relation with claims 1 and 28, canceling an essential feature from Wong would render Wong unsatisfactory for its intended purpose.

It follows that it cannot be argued that there is any suggestion in the prior art to modify Wong by canceling the essential feature of the individual single-mode fiber and focusing lens/junction element juxtaposed to the bundle.

The skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent from illuminating the facet of the bundle with a single optical input traveling in free space. It follows that illuminating the facet of the bundle with a single optical input traveling in free space is not obvious over Wong, at least because it would require a non-obvious modification of Wong.

Claim 11 as amended recites a method comprising *"illuminating the facet with a single optical input traveling in free space"*. Claim 11 is therefore not obvious over Wong and the cited prior art.

#### Claim 7

Claim 7 depends indirectly on claim 28. The Applicants note that the Examiner has failed to show that Berkey disclose in any manner an apparatus having a fiber bundle with a facet *"wherein the facet is adapted to receive a single optical input traveling in free space, the fibers having each a core and a cladding and a mode shape, the sum of the mode shapes of the fibers being calculated, and the core/cladding size ratio and stretch being selected, to*



*maximize coupling of the free space beam into the core ensemble*". Further, as detailed above in relation with claim 28, modifying Wong to have such features is not obvious because it implies canceling essential features of Wong. Accordingly, the Applicants respectfully submit that claim 28 is patentable over Wong and Berkey.

It follows that at least in view of its dependency on claim 28, claim 7 is patentable over Wong and Berkey.

#### Claims 16

Claim 16 depends indirectly on claim 11. The Applicants note that the Examiner has failed to show that Berkey disclose in any manner a method comprising *"illuminating the facet with a single optical input traveling in free space"*, as recited in claim 11. Further, as detailed above in relation with claim 11, modifying Wong to enable illuminating the facet with an optical input traveling in free space is not obvious at least because it implies canceling essential features of Wong. Accordingly, the Applicants respectfully submit that claim 11 is patentable over Wong and Berkey.

It follows that at least in view of its dependency on claim 11, claim 16 is patentable over Wong and Berkey.

#### Claim 24

Claim 24 depends indirectly on claim 20. The Applicants note that the Examiner has failed to show that Berkey disclose in any manner an apparatus having a fiber bundle with a facet *"having a cross section other than approximately equal to the cross section of an individual single-mode fiber"*, as recited in claim 20. Further, as detailed above in relation with claim 1, modifying Wong to have a cross section not approximately equal to the cross section of an individual single-mode fiber is not obvious, because it implies

canceling essential features of Wong. Accordingly, the Applicants respectfully submit that claim 20 is patentable over Wong and Berkey.

It follows that at least in view of its dependency on claim 20, claim 24 is patentable over Wong and Berkey.

#### Claim 14

The Examiner opines that Russel discloses a combiner having a very similar structure to that of Wong, where an optical input may be provided to the plurality of unfused fibers and combined into a single output at the facet, and further opines that it would have been obvious to use the splitter of Wong as a combiner, as is described by Russel, as doing so will increase the overall usability and functionality of the device, allowing the apparatus of Wong to bi-directionally function not only as a multiplexer, but also as a demultiplexer. The Applicants respectfully disagree.

As seen above in relation with claim 11, Wong discloses unambiguously that an essential feature of its invention is that an individual single-mode optical fiber has a junction end juxtaposed, through a focusing lens/junction element, to the end of the bundle of fiber. The skilled reader readily understands that the individual single-mode fiber and the focusing lens/junction element physically prevent from emitting light from the facet into free space.

Since the individual single-mode optical fiber and the focusing lens/junction element juxtaposed to the end of the bundle of fibers are essential features of Wong, it would not be obvious to cancel the single-mode optical fiber and focusing lens/junction element from Wong, whereby it is not obvious to modify Wong so as to be able to emit a single combined optical output at the facet into free space. It follows that claim 14 as amended, which recites a method comprising "*emitting the optical inputs as a single*

*combined optical output at the facet into free space*" is not obvious in view of Wong and the cited prior art.

Further, the Applicants note that contrary to the assertion of the Examiner, it does not seem necessary to cancel the single-mode optical fiber and focusing lens/junction element of Wong to provide a single output in free space from the facet in order to have Wong operate as a demultiplexer. The device of Wong as claimed can be used as a demultiplexer; a single output will be provided from the free end of the single-mode optical fiber coupled to the focusing lens/junction element.

#### Claim 5

The Applicants respectfully submit that the arguments used above to show that claim 14, which recites "*emitting the optical inputs as a single combined optical output at the facet into free space*", is new and non-obvious over Wong, can also be used to show that claim 5, which recites an apparatus "*wherein the plurality of optical inputs are emitted into free space at the facet as a single combined optical output*", is non-obvious over Wong and the cited prior art.

#### Claims 12-13, 17 and 19

Claims 12-13, 17 and 19 depend directly or indirectly on claim 11. The Applicants respectfully submit that at least in view of their dependency on claim 11, claims 12-13, 17 and 19 are patentable over the cited prior art.

New claims

New claim 31 depends on claim 27. The Applicants respectfully submit that at least in view of its dependency on claim 27, claim 31 is patentable over the cited prior art.

\* \* \*

In view of the above, Applicants submit that the application is now in condition for allowance and respectfully urge the Examiner to pass this case to issue.

The Commissioner is authorized to charge any additional fees that may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

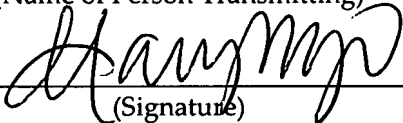
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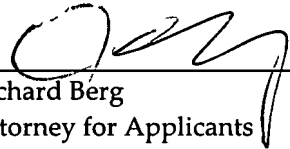


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